What is claimed is:

1. An electromagnetic chip with individually addressable micro-magnetic units comprising:

    a) a substrate;

    b) a plurality of micro-electromagnetic units on or within said substrate, substantially all of said micro-electromagnetic units structured to produce a magnetic field upon application of an electric field thereto; and

    c) means for selectively applying an electric current to one or more of said plurality of micro-electromagnetic units to produce a magnetic filed therein.

    wherein at least one of said micro-electromagnetic units is in a substantially horizontal configuration.

2. The electromagnetic chip of claim 1, wherein each micro-electromagnetic unit comprises:

    a) a core on or within said substrate and

    b) means for conducting an electric current about said magnetic core;

    wherein said core is a magnetic core or a magnetizable core.

3. The electromagnetic chip of claim 2, wherein said core comprises a ferromagnetic material or a ferrimagnetic material.

4. The electromagnetic chip of claim 2, wherein said means for conducting an electric current about said core comprises single or multiple loops of electric conductive traces around said core.

5. The electromagnetic chip of claim 4, wherein said loops of electric conductive traces are of a circular, a square, an elliptical, a triangular, a spiral or a squared-spiral shape and further wherein said loops of electric conductive traces are in the same plane or different planes.

6. The electromagnetic chip of claim 4, further comprising means for modulating a magnitude and a polarity of the electric current selectively applied to any one of said micro-electromagnetic units.

7. The electromagnetic chip of claim 1, wherein said means for selectively applying comprises conductive connections between a micro-electromagnetic unit and a source of electric current and switch means for alternately interrupting and establishing a flow of electric current through the conductive connections.

8. The electromagnetic chip of claim 7, wherein said switch means are mechanical, electronic or a combination thereof.

9. The electromagnetic chip of claim 1, wherein said mirco-electromagnetic units are arranged on or within said substrate in a substantially regular, repetitive pattern with substantially equal distances between neighboring units.

10. The electromagnetic chip of claim 1, wherein said micro-electromagnetic units have dimensions of width and length ranging between about 0.1 micrometer and about 1 cm.

11. The electromagnetic chip of claim 1, further comprising at least one functional layer; wherein said functional layer can immobilize at least one moiety or ligand.

12. The electromagnetic chip of claim 11, wherein said functional layer is selected from the group consisting of a hydrophilic molecular monolayer, a hydrophilic molecular monolayer with functional groups, a hydrophobic molecular monolayer, a hydrophobic molecular monolayer with functional groups, a hydrophilic membrane, a hydrophilic membrane with functional groups, a hydrophobic membrane, a hydrophobic membrane with functional groups, a hydrophilic gel, a hydrophilic gel with functional groups, a hydrophobic gel, a hydrophobic gel with functional groups, a porous material, a porous material with functional groups, a non-porous material and a non-porous material with functional groups.

13. The electromagnetic chip of claim 12, wherein said functional groups are selected from the group consisting of aldehydes, carbodiimides, succinimydyl esters, antibodies, receptors and lectins.

14. The electromagnetic chip of claim 11, further comprising at least one moiety or ligand immobilized on or within said functional layer.

15. The electromagnetic chip of claim 14, wherein said moiety or ligand comprise a material selected from the group consisting of nucleic acid molecules, DNA, RNA, polypeptides, proteins, carbohydrates, lipids, prokaryotic cells, eukaryotic cells, prions, viruses, parasites, antibodies, lectins or receptors.

16. An electromagnetic chip, comprising:

a) a substrate;

b) an one or more micro-electromagnetic units, comprising;

i) a core;

ii) a coil of electrically conductive material around said core;

wherein said core is oriented horizontally within an electromagnetic chip.

17. The electromagnetic chip of claim 16, wherein said one or more micro-electromagnetic units are in an array.

18. The electromagnetic chip of claim 16, wherein said at least one of said micro-electromagnetic units is individually addressable.

19. The electromagnetic chip of claim 16, wherein all of said micro-electromagnetic units are individually addressable.

20. The electromagnetic chip of claim 16, wherein said array comprises a plurality of micro-electromagnetic units arranged substantially in parallel.

21. The electromagnetic chip of claim 20, wherein said array comprises a particle switch

22. The electromagnetic chip of claim 20, wherein said array acts as traveling wave magnetophoresis device.

23. The electromagnetic chip of claim 16 wherein said electromagnetic unit exhibits sinusoidal current.

24. A method of making an micro-electromagnetic unit, comprising:

a) providing a surface

b) providing a plurality of substantially parallel lines of conductive material onto said surface;

c) providing a first layer of insulating material onto said plurality of substantially parallel lines of conductive material;

d) providing a core onto said first layer of insulating material above said plurality of substantially parallel lines of conductive material;

e) providing a second layer of insulating material onto said core;

f) exposing the ends of substantially each of said substantially parallel lines of conductive material;

g) providing conductive material to form a coil;

h) optionally providing a third layer of insulating material over said coil.

25. A micro-electromagnetic unit made using the method of claim 24.

26. An array of micro-electromagnetic units made using the method of claim 24.

27. An electromagnetic chip comprising one or more micro-electromagnetic units made using the method of claim 24.

28. A micro-electromagnetic unit, comprising:

a) a first set of conductive tracings insulated from a core by a first layer of insulating material;

b) a set of connecting conductive materials connecting said first set of conductive tracings to form a coil around said core;

wherein said coil is insulated from said core by insulating material;

wherein when said coil is energized, the core exhibits a magnetic field.

29. An array of micro-electromagnetic units comprising at least one microelectromagnetic unit of claim 28.

30. An electromagnetic chip comprising at least one microelectromagnetic unit of claim 28.

31. A traveling wave magetophoretic device comprising two or more micro-electromagnetic units of claim 28.

32. A particle switch comprising two or more micro-electromagnetic units of claim 28.

33. A micro-electromagnetic unit, comprising:

a) a core;

b) a first set of conductive tracings insulated from said core by insulating material;

c) a set of connecting conductive material connecting said first set of conductive tracings with a second set of conductive tracings;

wherein said first set of conductive tracings, said set of connecting conductive materials and said second set of conductive tracings form a coil around said core;

further wherein said core is insulated from said coil by insulating material.

34. The micro-electromagnetic unit of claim 33, further comprising a top layer of insulating material.

35. The micro-electromagnetic unit of claim 33, further comprising at least one core extension structure.

36. The micro-electromagnetic unit of claim 33, further comprising at least one dip.

37. An array of micro-electromagnetic units comprising at least one microelectromagnetic unit of claim 33.

38. An electromagnetic chip comprising at least one microelectromagnetic unit of claim 33.

39. A traveling wave magetophoretic device comprising two or more micro-electromagnetic units of claim 33.

40. A particle switch comprising two or more micro-electromagnetic units of claim 33.

41. The electromagnetic chip of claim 33, wherein the material of said first insulating layer is selected from the group consisting of silicon dioxide, silicon nitride, plastic, glass, ceramic, photoresist and rubber.

42. The electromagnetic chip of claim 33, further comprising a substrate.

43. The electromagnetic chip of claim 42, wherein said substrate comprises a material selected from the group consisting of silicon, glass, ceramic, silicon dioxide and plastic.

44. The electromagnetic chip of claim 33, wherein said conductive traces comprise a material selected from the group consisting of aluminum, gold, silver, tin, copper, platinum, palladium, carbon and semiconductor materials.

45. The electromagnetic chip of claim 33, further comprising a functional layer.

46. The electromagnetic chip of claim 45, wherein said factional layer is selected from the group consisting of a hydrophilic molecular monolayer, a hydrophilic molecular monolayer with foundational groups, a hydrophobic molecular monolayer, a hydrophobic molecular monolayer with functional groups, a hydrophilic membrane, a hydrophilic membrane with functional groups, a hydrophobic membrane, a

hydrophobic membrane with functional groups, a hydrophilic gel, a hydrophilic gel with functional groups, a hydrophobic gel, a hydrophobic gel with functional groups, a porous material, a porous material with functional groups, a non-porous material and a non-porous material with functional groups.

47. The electromagnetic chip of claim 33, wherein said functional groups are selected from the group consisting of aldehydes, carbodiimides, succinimydyl esters, antibodies, receptors and lectins.

48. The electromagnetic chip of claim 33, further comprising a fluidic chamber for bringing liquids into contact with said array.

49. A method for manipulating magnetic particles, comprising the steps of:

a) providing an electromagnetic chip comprising one or more micro-electromagnetic units;

b) contacting a sample comprising magnetic particles with said electromagnetic chip; and

c) modulating electric currents applied to one or more of said micro-electromagnetic units so as to change the magnetic field distribution of said electromagnetic chip, thereby altering magnetic forces acting on said magnetic particles.

50. The method of claim 49, wherein said magnetic particles comprise at least one moiety, wherein said moiety is optionally linked to said magnetic particle.

51. The method of claim 50, wherein said link is through linkage molecules, a covalent bond or biological affinity.

52. The method of claim 50, wherein said moiety is selected from the group consisting of nucleic acid molecules, DNA, RNA, polypeptides, proteins, carbohydrates, lipids, prokaryotic cells, eukaryotic cells, prions, viruses, parasites, antibodies, lectins or receptors.

53. The method of claim 49, wherein said electromagnetic chip comprises a magentophoretic device. .

54. The method of claim 49, wherein said electromagnetic chip comprises a particle switch.

55. The method of claim 49, wherein said electromagnetic unit comprises a core that optionally comprises at least one terminal structure.

56. The method of claim 49, wherein said electromagnetic chip comprises dips.